HISTORIC PROPERTY INVENTORY FORM

State of Washington, Department of Community Development
Office of Archaeology and Historic Preservation
111 21st Avenue Southwest, Post Office Box 48343
Olympia, Washington 98504-8343 (206)753-4011

IDENTIFICATION SECTION

Field Site No. 107-KW **OAHP No.** _____ **Date Recorded** 4-Apr-98
Site Name Historic Effluent Water Retention Basin
Common Retention Basin
Field Recorder Jim Sharpe
Owner's Name U.S. Department of Energy, Richland Operations Office
Address P.O. Box 550
City/State/Zip Code Richland, WA 99352

Status

- [x] Survey/Inventory
- [ ] National Register
- [ ] State Register
- [ ] Determined Eligible
- [ ] Determined Not Eligible
- [ ] Other (HABS, HAER, NHL)
- [ ] Local Designation

Photography

Photography Neg. No. 88081923-13cn
(Roll No. & Frame No.)
View of KW-Retention Basins
Date 8/22/88

LOCATION SECTION

Address Building 107-KW, 100-K Area
City/Town/County/Zip Code Richland/Benton County/99352
Twp 13 **Range** 26 **Section** 31 **l/4 Se** SE **1/4 1/4 Sec** SE, SE
Tax No./Parcel No. **Acreage**
Quadrangle or map name Coyote Rapids, Wash. Quad. 1986
UTM References Zone 11 **Easting** **Northing** 5169300
Plat/Block/Lot
Supplemental Map(s)

Classification	[ ] District	[ ] Site	[x] Building	[ ] Structure	[ ] Object
District Status	[x] NR	[ ] SR	[ ] LR	[ ] INV	
Contributing	[x]	**Non-Contributing**	[ ]		

District/Thematic Nomination Name Hanford Site Manhattan Project and Cold War Historic District

Description Section

Materials & Features/Structural Types

Building Type Industry
Plan
Structural System
No. of Stories

Roof Type

- [ ] Gable
- [ ] Flat
- [ ] Monitor
- [ ] Gambrel
- [ ] Shed
- [ ] Hip
- [ ] Pyramidal
- [x] Other (specify) No roof, open air

Cladding (exterior Wall Surfaces

- [ ] Log
- [ ] Horizontal Wood Siding
  - Rustic/Drop [ ]
  - Clapboard [ ]
- [ ] Wood Shingle
- [ ] Board and Batten
- [ ] Vertical Board
- [ ] Asbestos/Asphalt
- [ ] Brick
- [ ] Stone
- [ ] Stucco
- [ ] Terra Cotta
- [ ] Concrete/Concrete Block
- [ ] Vinyl/Aluminum Siding
- [x] Metal (specify) Steel tanks
- [ ] Other (specify)

Roof Material

- [ ] Wood Shingle
- [ ] Wood Shake
- [ ] Composition
- [ ] Slate
- [ ] Tar/Built-up
- [ ] Tile
- [ ] Metal (specify)
- [x] Other (specify) Open air
- [ ] Not visible

Foundation

- [ ] Log
- [ ] Post & Pier
- [ ] Stone
- [ ] Brick
- [ ] Not visible
- Concrete
  - [ ] Block
  - [x] Poured
  - [ ] Other (specify)

High Styles/Forms (Check one or more of the following)

- [ ] Greek Revival
- [ ] Gothic Revival
- [ ] Italianate
- [ ] Second Empire
- [ ] Romanesque Revival
- [ ] Stick Style
- [ ] Queen Anne
- [ ] Shingle Style
- [ ] Colonial Revival
- [ ] Beaux Arts/Neoclassical
- [ ] Chicago/Commercial Style
- [ ] American Foursquare
- [ ] Mission Revival
- [ ] Spanish Colonial Revival/Mediterranean
- [ ] Tudor Revival
- [ ] Craftsman/Arts & Crafts
- [ ] Bungalow
- [ ] Prairie Style
- [ ] Art Deco/Art Moderne
- [ ] Rustic Style
- [ ] International Style
- [ ] Northwest Style
- [ ] Commercial Vernacular
- [ ] Residential Vernacular (see below)
- [x] Other (specify) Industrial Vernacular

Integrity (Include detailed description in **Description of Physical Appearance)**

	Intact	Slight	Moderate	Extensive
Changes to plan	[ ]	[ ]	[ ]	[x]
Changes to windows	[ ]	[ ]	[ ]	[x]
Changes to original cladding	[ ]	[ ]	[ ]	[x]
Changes to interior	[ ]	[ ]	[ ]	[x]
Other (specify)	[ ]	[ ]	[ ]	[x]

Demolished

Vernacular House Types

- [ ] Gable Front
- [ ] Gable Front and Wing
- [ ] Side Gable
- [ ] Cross Gable
- [ ] Pyramidal/Hipped
- [ ] Other (specify)

NARRATIVE SECTION

Study Unit Themes (check one or more of the following)

[ ] Agriculture	[ ] Conservation	[ ] Politics/Government/Law
[ ] Architecture/Landscape Architecture	[ ] Education	[ ] Religion
[ ] Arts	[ ] Entertainment/Recreation	[ ] Science & Engineering
[ ] Commerce	[ ] Ethnic Heritage (specify)	[ ] Social Movements/Organizations
[ ] Communications	[ ] Health/Medicine	[ ] Transportation
[ ] Community Planning/Development	[ ] Manufacturing/Industry	[x] Other (specify) Manhattan Project and Cold War Era
	[ ] Military	[x] **Study Unit Sub-Theme(s)** Waste Management, Treatment, (Liquid)

Statement of Significance

Date of Construction 1955 Architect/Engineer/Builder Kaiser Engineers

[x] In the opinion of the surveyor, this property appears to meet the criteria of the National Register of Historic Places.
[x] In the opinion of the surveyor, this property is located in a potential historic district (National and/or local).

The 107-KW Retention Basins were located in eastern Washington on the Hanford Site at the K-Reactor Area. The K-Reactor series introduced a new technology in retention basin design. The basins were designed as temporary storage for radioactive decay and thermal cooling of effluent water from the 105-KW Reactor prior to its release to the Columbia River. After effluent water passed through the reactor it became radioactive. Retention basins served as stilling ponds where large particles of radioisotopes were allowed time to settle to the bottom and remain before the water was released to the Columbia River. This method was a natural radioactive decay process designed to reduce the chances of contamination entering the Columbia River. This was accomplished through a series of events using three tanks that made up the retention basin system. The three tank system was a new approach to retention basin technology. Initially, operation of the system included one tank be in use, one discharging to the effluent line and to the river or the 116-K-1 trench, and the third on standby. Each tank was filled from the top on one side and drained from the bottom on the other side. Automatic valving routed the flow to an empty tank and dumped the water from the full tank through the valve in the bottom to the river. If the tank contained unusual effluent it was discharged into a trench. This design allowed radioisotopes time to settle to the bottom of the tanks. The estimated holdup time for the KW Retention Basin was about 1 hour.

Problems began early in the operations of the system. When a tank was dumped large amounts of air became trapped in the system causing the outfall piping to float and fail resulting in a change in operating procedures. Efforts to correct the problem were unsuccessful and the system continued to operate poorly resulting in inadequate effluent flow through the basins. By 1959, the basins were used on a flow through basis because of difficulties with the dump valves. This was accomplished by the cooling effluent entering at the top on one side and exiting through the overflow at the top of the other side of the basins. Over time the baisns leaked in both the structure and lines leading to and from the basins. The system was in operation from 1955 until 1971. In 1971, the retention basins were deactivated. Pipe entrances were covered to deter wildlife from entering and the walls were washed and 2 to 4 feet of backfill added to the ground. In 1993, the tanks were dismantled as part of the Hanford Site cleanup operations.

In accordance with the Programatic Agreement this site from has been prepared to documnet this site type.

Description of Physical Appearance

The 107-KW Retention Basins were designed to hold the reactor cooling water effluent for a sufficient period of time to allow for the radioactive decay and thermal cooling of the 105-KW Reactor effluent water prior to its release into the Columbia River. The Retention Basins consist of three open topped circular steel tanks and were north of the 105-KW Reactor. The tanks extend 29 feet above grade and two feet below grade. Each tank had a diameter of 250 feet with a capacity of 9 million gallons and were constructed of carbon steel with four separate lifts. Individual lifts varied in height and thickness. The bottom lift was 1.4375-inches thick and 6.7 feet high. The second lift was 1.0625-inches thick and 6.1 feet high. The third lift was 0.750-inches thick and 7.3 feet high. The final lift was 0.375 inches thick and 5.8 feet high. On the outside of the tanks was a catwalk that served as a stiffner and access point. The bases of the tanks were steel 0.375-inch thick set on an 8-inch bed of 3/4-inch stone underlain with a 2-inch layer of asphalt treated sand. Under each tank was a maintenance tunnel 8-feet by 10-feet which contained a 66-inch drainline. Each retention basin floor had about four feet of earth covering that provided containment. The circumference of the tank had a concrete foundation. Effluent was transported into the tanks through a 6-foot diameter pipe. Inlet flumes were installed in each tank to direct water. Effluent water could exit through three seperte systems, 1) overflow at the top of the basin 2) drained by a 72 inch line to the river, or 3) drained by a 36-inch line into a crib. The retention basins were designed not to be drained below 14-inches. If the retention basins had to be drained water could be drained through the 42-inch drain lines into a crib or trench east of the K-East Reactor Area.

Kaiser Engineers awarded four contracts to assist them in the construction of the retention basins. Lewis Hopkins Company constructed the foundation, tunnel, and the oil treated sand and gravel. Pittsburgh-DesMoines Steel Company constructed the retention tanks, L.H. Hoffman Company constructed the inlet valve box and supporting structures, and H.P. Fisher and Sons contracted for the sandblasting and painting for the retention basin tanks. Materials used for the construction of the tanks included the following: excavation 78,000 cy, concrete 7,020 cy, re-steel 147.8 tons, miscellaneous iron 227.5 tons, steel plate 2,386.1 tons, pipe 4,902 lf, sand and rock 5,821 cy, and welding wire 27,900 lb.

Major Bibliographic References

Drawing s H-1-24429, H-1-25022, H-1-25529, H-1-34307, M-1903 sheet 2
Bechtel Hanford, Inc. 1996. *Final Report for the Dismantlement and Interim Stabilization of the 107-C, 107-KE, and 107-KW Retention Basins.* BHI-00536 Rev. 0. Richland, Washington.
Douglas United Nuclear, Inc. 1962. *Detailed Operating Procedures KW Reactor.* Richland, Washington.
General Electric Company. 1957. *Completion Report Project CA-512 Volume II 100-K Water Plants.* HW-24800-103. Richland, Washington.
General Electric Company. 1959. *Direct Disposal of Reactor Effluent.* HW-60529. Richland, Washington.
UNC Nuclaear Industries Company. 1984. *100 Deactivated Area Pictorial Review.* UNI-2780. Richland, Washington.
Westinghouse Hanford Company. 1984. *100-K Area Technical Baseline Report.* WHC-SD-EN-TI-239. Richland, Washington.